



1894

EVIDENCE OF MR. JAS. FLETCHER
ENTOMOLOGIST AND BOTANIST, DOMINION EXPERIMENTAL FARMS
BEFORE THE
SELECT STANDING COMMITTEE OF THE HOUSE OF COMMONS
ON
AGRICULTURE AND COLONIZATION
Session of 1894

PRINTED BY ORDER OF PARLIAMENT.

10.

of
of
of e

add
diff
sho
mitt
tanc
and
food
feste
fare
have
or s
the
some
comm
ing y
mitte
and
obtain
know
the n
will su
purch
think
in the
can b
the se
Ottaw

Q.
have b
succes
was du
water
ordinar
is a clo
advants
clovers
red clov

Q.
broadca
Q.
other clo
1

COMMITTEE ROOM 46,

HOUSE OF COMMONS, 5th June, 1894.

The Select Standing Committee of Agriculture and Colonization met this day at 10.30 a.m., Dr. Sproule, chairman, presiding.

The CHAIRMAN:—Gentlemen.—Mr. James Fletcher, entomologist and botanist of the experimental farms, is with us this morning. I presume that it is the wish of the committee that he should make a statement of his work in the departments of entomology and botany.

Mr. Fletcher, being called, addressed the committee as follows:—

Gentlemen,—I have on this occasion, when I am to make my annual report or address to this committee, brought with me certain specimens to illustrate the different plants which I shall refer to, as on previous occasions, and also specimens showing the work of the different classes of injurious insects. I thought the committee would like to see them, as being probably of the greatest agricultural importance. I will refer first to some of the experiments carried out with regard to pasture and hay grasses at the Central experimental farm. The importance of hay, and all food for cattle, need merely be mentioned on account of the great interest which is manifested now-a-days in dairying, and the important bearing that industry has on the welfare of the country at large. I have with me this morning some of the grasses which we have been growing and studying at the Central experimental farm for the past five or six years, and of which we have now pretty complete information. During the winter, in addressing farmers' meetings, I had opportunities of speaking on some of these grasses, and I also had the pleasure of meeting some of the members of this committee in their own constituencies. I think this is a good opportunity for showing you samples of the grasses, of which I have so often spoken, before this committee. This season has been particularly favourable for the development of grasses, and now is also a very convenient opportunity for exhibiting the success we have obtained in the cultivation of these valuable fodder plants. Some, of course, are well known here and in Europe; but many of them are not natives of Canada. The best of the native grasses we hope to have introduced at no distant date by seedsmen who will supply the seed to farmers, as already there is a demand for some which cannot be purchased. I will speak of some clovers first. The one that I hold in my hand is, I think, of great importance. It is Lucerne, and is well known in the old country and in the western states, where it is called Alfalfa. It is as good a kind of clover as can be grown. The crop is always heavy, and you will get two heavy cuttings in the season, and in some cases three. It seems to suit our soil very well indeed, at Ottawa, and has succeeded well in many other places where I have had it tested.

By Mr. Pope:

Q. When was this specimen grown?—A. The seed was planted last spring. We have been growing it for six years. One of my correspondents found that it did not succeed in the eastern townships. It was rather a disappointment there. This was due to the fact, I think, that the ground was too damp and flat. Where the water comes near the surface of the soil, Alfalfa does not succeed so well, but in ordinary rich land, or even on dry poor land, it has succeeded remarkably well; it is a clover which should be added to all mixtures for pasture grasses. It can be mixed advantageously with Orchard grass, which is a valuable grass. Some of the other clovers are not suited for mixing with Orchard grass, as for instance the Mammoth red clover, which is too late in coming to perfection.

By Mr. McGregor:

Q. How do you sow the Alfalfa?—A. Like ordinary clover; either in drills or broadcast.

Q. Is it sown alone?—A. Yes; or mixed with grass. Just the same as any other clover.

By Mr. Hughes :

Q. When ripened, how does it differ from other hay?—A. It should not be allowed to ripen, for Alfalfa hay is poor. It is frequently cut and fed green, but if cut at the right stage makes excellent hay. I would like to draw the attention of the committee to the difference between Mammoth red clover and the ordinary June red clover. This specimen of June clover which I have here in flower is very forward, as this has been a very early season. You see it is in flower and very much in advance of this other, which is Mammoth red, and will not be in flower for ten days. From this we learn the fact that it does not do to mix the Mammoth red clover with the Orchard grass which is ready to cut two weeks sooner, or at the same time as the June red clover.

By Mr. O'Brien :

Q. I have tried this Alfalfa twice in different years and not a single plant lived?—A. Did you get a good catch? Did the seed germinate well?

Q. Yes?—A. I am glad to get this information. So little of this valuable plant has been grown in Canada hitherto that it may as yet be regarded as experimental. Personally, I may say that I have had far greater success than I anticipated.

Q. One of my neighbours, however, has grown it for many years?—A. Is that on dry ground?

Q. It is high land, and he has succeeded very well with it?—A. Our experience here has certainly been such as to induce me to recommend it for trial everywhere, except on wet land. On Mr. Greenshields's farm, in the eastern townships, they had a fine catch last year, but this spring it was all winter killed. I think that was because the water was near the surface of the soil or the land was springy.

By Mr. Girouard (Two Mountains) :

Q. Could that be grown in the province of Quebec, where the climate is cold?—A. I have had one or two satisfactory reports from the province of Quebec.

Q. From the district of Montreal?—A. Yes.

Q. And it has succeeded?—A. In the district of St. Hyacinthe it has done very well, and in some parts of the eastern townships. From what I have said about the difference in the time of flowering, of red June and Mammoth clovers, it is plain that for mixing with June clover, Orchard grass is preferable to Timothy, and that the clover to mix with Timothy most satisfactorily is Mammoth red.

By Mr. McMillan :

Q. Does the Alfalfa impoverish the land?—A. No. If it is grown successively for three or four years and then turned under, it will probably enrich the land as much as any other clover.

By Mr. Semple :

Q. Does the stock seem to like it?—A. Very much indeed.

By Mr. Cargill :

Q. If it is sown alone when would you cut it, the first year?—A. Yes, you would get a good crop. Ours was not sown early in the spring, and we cut in the autumn. There was a heavy crop, but I do not remember the amount. The second year we cut two heavy crops.

By Mr. Carpenter :

Q. It is intended for green food?—A. Yes, in England it is largely grown and used almost entirely for soiling.

Q. How does the hay from the June clover compare with the other?—A. The Mammoth is rather hard to cure, but makes excellent hay with care.

Q. Rather coarser, is it not?—A. Yes, but I think one is as good as the other as far as feeding value is concerned.

By Mr. Pridham :

Q. Will the Mammoth grow two crops?—A. Yes, the Mammoth lasts longer than the ordinary June clover. There is a much heavier crop of Mammoth clover the third year than of the common Red. It is more nearly perennial than the other. The Red clover is biennial, but there are always a few plants come up after the second year either from seeds that did not grow, or from seeds of the first year's crop. The Mammoth is called a perennial, but neither is a true perennial.

I will now exhibit a plant which has been largely advertised, and which, therefore, one must be careful in dealing with; the (*Lathyrus silvestris*, var *Wagneri*), or Wagner's Wood Pea. It is a variety of the wood-pea of Europe, and is advertised as one of the best crops in the way of a clover which can be grown. I think from what I have seen of it, that it almost comes up to what the advertisement claims for it. It is now the beginning of June, and this is the growth it has made this year already. In another fortnight or three weeks, just before it flowers, it will make a mass nearly three feet high, of very succulent rich fodder. At present, however, the seed is too expensive for it to come into general use.

By Mr. Roome :

Q. Did you seed this spring?—A. No, last spring.

Q. The stock do well on it?—A. Yes, they seem to be very fond of it.

By Mr. Carpenter :

Q. Would it do for pasture?—A. No, it makes too heavy a growth. It would require to be cut.

The Orchard grass is perfectly well known to everybody, but I have brought a specimen, as questions are frequently asked about it. You see it is just in the condition to cut now, and it should be cut just as it is flowering, or even a little before it flowers. There is a very great diversity of opinion about the value of Orchard grass. I think it is chiefly due to the fact that it is frequently not cut at the right time. The grass as a soiling crop is extremely succulent. After the flowers have expanded it makes very dry hay, and it has the disadvantage of making very bulky hay. While most grasses lose about 45 per cent of their weight by water, this loses nearly 10 per cent more. But it must be remembered that this is the grass upon which, above all others, Irish hunters, supposed to be the best horses for endurance in the world, are chiefly fed. Of course it does not follow that it would do well with us, but our experience of it at the Central farm has been satisfactory. We have had large quantities of good grass and good hay, but the hay is very bulky for its weight.

By Mr. O'Brien :

Q. You must cut it young?—A. Yes, when it is left too long it becomes dry and hard and the cattle do not like it.

By Mr. McMillan :

Q. It is coarse, is it not?—A. Yes, rather.

Q. But in a dry season it is one of the best we have got. It is a deep rooter, and succeeds when others fail?—A. Yes, I am very glad you mentioned that, because that is one of the most important points about it. I mean its rapidity of growth after cutting. That grass, in June, if cut one day, and there is a shower in the night, will have grown three inches, by the next day, of tender, succulent leaves.

By Mr. O'Brien :

Q. With me, this has come up three times as much as ever before without any sowing. It is springing up everywhere?—A. It increases very much, but entirely from seed, late in the season there are small heads form, which are not noticed, but these all bear seed, and it is to these, I think, that the increase is due. These seeds are self-sown in the autumn. My experiments, however, have given the best results with this grass sown in the spring. We tried some experiments in growing different grass seeds in the spring and autumn, and though most grasses do better when

sown in spring, one or two varieties do very much better when sown in the autumn. Here is an instance: This is the Meadow Foxtail, a grass that makes a very rich, soft, fine hay, and is very early, as you see. It has rather a superficial resemblance to Timothy, but when you examine it closely you find it different, and very much earlier. I think the Meadow Foxtail very valuable for its hay, on account of its earliness. It is ready to cut now, and if grown alone gives a heavy crop after the first year, or when mixed with June clover makes a very valuable mixture. In choosing hay grasses or mixtures for various purposes, you have to consider chiefly the time they flower, because a grass is at its best just at the time it is in flower. You know the old saying, "Between the two flowers of Timothy is the time to cut." When the first flowers open, the anthers are purple, and later on when they have shed their pollen they are white, and afterwards they turn brown. The head of Timothy consists of a great many flowers, and from the time the first flowers open it takes about three or four days before the last flowers expand their anthers; by this time, the first extruded anthers have turned brown, and there is the appearance of having been two periods of flowering; but really there is only one flowering for each flower. The beginning of June is a time when we sometimes want good fodder, when the silos are, as a rule, about empty. Meadow Foxtail has a peculiar value then for its earliness.

By Mr. Roome:

Q. Is it a good feed?—A. Excellent. It is grown in some parts of Nova Scotia under the name of French Timothy.

By Mr. Pope:

Q. Would it grow with Orchard grass?—A. Yes. They could be mixed very well, this sample is a little earlier than the Orchard grass I have exhibited; but they have about the same season. Another very early grass is the Tall Oat grass. I am not prepared to recommend it specially, except for the weight it would introduce. It has a peculiar bitter flavour, but cattle like a small quantity in mixtures.

By Mr. McMillan:

Q. Does it grow well on dry soil?—A. Not so well as some other grasses.

By Mr. Carpenter:

Q. Is that called wild oats?—A. No. That is quite a different grass. This is a perennial. Here is another of the Fox-Tail grasses, (*Alopecurus agrestis*), but this is an annual. This sample was sown last September and it may have a peculiar value from this fact. If you want to use a piece of land or clean it up, you can sow this grass in September, and by the following June you can cut it and have the land ready for corn. That is the annual Fox-Tail. I would ask you to observe what a particularly succulent and soft grass it is, but it is not highly valued because it is an annual.

By Mr. O'Brien:

Q. Are not all the Fox-Tails annuals?—A. No. Some, the Meadow Fox-Tail, for instance, is a perennial. In fact it does not get to its full strength to produce until the second or third year.

By Mr. Pope:

Q. Can you sow it in the spring?—A. Yes. This next grass is one which I have already brought before the attention of the committee on a previous occasion, and it is one which I think cannot be brought to public attention too frequently, on account of its great importance. Of all the different imported grasses brought into America, I do not think there is one which can compare with it in value. It is the Awnless Erome grass, or Austrian Bromegrass (*Bromus inermis*). It will grow over an enormous area, and is especially well adapted for the North-west. I have distributed it to correspondents all over Canada, and uniformly satisfactory reports have been received from all who have tried it. It has one great disadvantage, viz: a habit of growth like quack grass. I am recommending it particularly for the

North-west in those districts where difficulty has been experienced in getting any grass to grow. Professor Robertson who has just returned from Indian Head, tells me that on the 25th of May, this same grass was 25 to 28 inches high. Those who know that part of the country will realize its remarkable growth up to that time. In my judgment, there is nothing to compare with it; I have also recommended it for use in those portions of old Canada, in waste corners where the fields are broken, where there are upland or wet corners which cannot be well used for anything else. Many of such portions of land cannot be cleaned up very well or used, but if you have a grass like this, coming up year after year, it will have a special value even in the more thickly populated portions of the country.

By Mr. Hughes:

Q. How would it do on thin soil, over rocks?—A. Not very well.

By Mr. Cargill:

Q. Does it do well on wet land?—A. Very well indeed. I have some growing at the Central experimental farm, on a piece of wet land where the water lies for considerable time, and this grass has done better than elsewhere.

By Mr. Roome:

Q. Did it make good pasture?—A. It is rather coarse for pasture, but makes a fine soiling crop.

By Mr. Wilson:

Q. Will it do well where the land is dry?—A. Yes; in the North-west where it is dry it has done remarkably well. A singular feature is that, in the North-west, it does well on the dry lands and here it has succeeded splendidly on wet land.

Q. But rather better on the wet than on the dry?—A. Here it has done well on the wet land and up there on the dry.

By Mr. Hughes:

Q. By "dry" do you mean a dry atmosphere rather than the soil?—A. I meant both, in the North-west the air is generally dry over large areas.

Q. Why should it not do well on thin soil over rock?—A. Well, some other kinds would do better, I have a grass that will pay you better. This, although a small grass, has great nutritive value. On dry, rocky lands it does exceedingly well. On rich soil at the farm it has produced nearly two tons of hay. It is particularly heavy on soils which are rich. It is known in this part of the country as Wire grass or Canada Blue grass (*Poa compressa*). One of the unfortunate things in connection with grasses is that so many have different English names. In this connection I might mention an incident which occurred not long ago on a visit which I paid to the eastern townships. I was taken to task at Richmond because I recommended this grass to be grown on their rocky pastures. I informed them there was no grass to be compared with it. Afterwards I was told that some of the farmers had complained that this man had come all the way from Ottawa to tell them to grow Wire grass, which down there is not regarded as of any value. This misunderstanding arose from the fact that the grass which they call Wire grass is totally different from the one which I hold in my hand and which I had recommended to them. In fact their Wire grass is Quack grass.

Q. What is the official name of Wire grass?—A. *Poa compressa*. It is largely sold for lawns by Canadian seedsmen, under the name of Canadian Blue grass. It is valuable as a field grass but not as a lawn grass for which it is usually sold. In spring and in the autumn it turns purple, and gives a purplish or rusty aspect to the lawn.

Q. How would it do in August and September?—A. For cutting green?

Q. For pasture?—A. I should think Orchard grass would be one of the best because it keeps on providing new green leaves all through the season, if fed off or cut.

Q. Would Orchard grass do on thin soil?—A. No; it likes rich soil better. Do you refer to those rocky ledges around Lindsay?

Q. No. Lindsay has as good a soil as you can find in Canada. I referred to parts of North Victoria?—A. Where they raise the best sheep in the world.

By Mr. O'Brien:

Q. White clover and this *poa compressa* make a splendid mixture?—A. The best possible for upland pastures.

This grass I now have in my hand is the Hard Fescue, and this the Sheep's Fescue. The Hard Fescue is of rather larger growth than the other. Both are very rich grasses but are only suitable over thin lands, on rock or on sandy soil; with exception of the Wire grass they are perhaps the best grasses which can be grown in such places.

By Mr. Featherston:

Q. Does Sheep Fescue ripen rapidly?—A. This will be ripe in about a fortnight from now, which is ten days earlier than in ordinary seasons. The food is in the leaves. The sheep will pick off the leaves and eat it in preference to many other grasses. It is a very small grass but makes good pasture; it is not a hay grass at all.

By Mr. O'Brien:

Q. Have you tried Rib grass, the English pasture grass?—A. No, but some one did before us. It has been tried in Michigan and in some parts of Canada and where it occurs it is a bad weed. Another useless plant of which notices have appeared is Spurry. I am sorry to see that the Michigan experimental station has recommended it. In Nova Scotia it is known as one of their worst weeds. It is called Corn Spurry in England. It has a soft succulent stem and will grow on pure sand without any apparent fertility in it. When it once gets into the land, as we have found at the experimental farm, it is extremely difficult to eradicate, and not worth anything as a crop, on account of its small size.

By Mr. Featherston:

Q. Does it grow high?—A. No; only from three to four inches. It is so succulent and brittle that an animal would easily crush it into the ground. The leaves are small and hair like, and it is perfectly valueless as a fodder grass for us in Canada, where we can grow much better plants, in every way.

By Mr. Cochrane:

Q. It grows in gardens in Ontario?—A. Occasionally I have seen it in gardens. The Rib grass asked about by Mr. O'Brien is recommended for sheep, but it is certainly a mistake to grow it. It is found in western Ontario where it has given considerable trouble. Speaking of the fescues, this is a specimen of the Red Fescue. While the other two mentioned are bunch grasses, the Red Fescue runs freely by underground stems and forms a sod. It is a very valuable grass. I only got a small sod of this variety last spring from its discoverer, Mr. J. B. Olcott, of Connecticut. I have not had seed enough to send out samples, but next year I hope to be able to supply the seed for trial on poor soils. I think it will succeed best on good soil, but should make a good showing even on poor soils.

Here is a grass to which I would draw special attention. It is the common June grass (*paturin des prés*) *Poa pratensis*. Possibly there is no grass anywhere in the world with regard to which there is such a diversity of opinion as to its value. This, to some extent, may be due to the fact that it varies so much. Botanists have great difficulty in classifying its many varieties, some of which are good, others far less so. It is found all over the continent, but in such varying forms that only botanists are able to separate them. I have three forms here, grown under exactly

the same circumstance, and you see the difference between them, not only in size, but in habit of growth and earliness. This first one was found near Calgary. The stems of the original plant were four feet high. I received them from Major Walker of Calgary. Grown at Ottawa, it only attains a height of three feet. It is very early, as you see the seed is even now fully formed, while on this other form of the same grass from Glacier, the stems are only just forming, there are at least three weeks' difference between the two. Although such a small grass, and counted of little value, it is unquestionable that it is of the greatest possible value for pasture and dairy purposes. It is rich and succulent, and will crop all the time. One of the reasons why farmers have thought so little of it is, I think, because when estimating its value they have considered it as a hay grass. It ripens sooner than they want to cut their hay, and is seldom cut for hay. In about a fortnight's time the seed will be ripe. Having produced its small slender stem early in June, it makes its growth close to the surface, each plant spreads rapidly and soon forms a close sod. If you let cattle get into a wood and browse down the undergrowth, it will soon be converted into a pasture by this June grass. Wherever cattle eat the stems, the seeds are carried in their manure, and this added to its great power of spreading, soon enables it to cover the ground. June grass gives us a succulent rich food for cattle, and at the same time keeps on growing and producing all the time. In fact, the more it is cut or fed off, the better it succeeds. I do not believe that there is any other grass that will compare with it in value. If you will only watch your pastures, and not overstock them, there is no reason why this should not be a truly perennial grass, lasting for over two hundred years, and of course many of the parks for much longer, the only thing which they have received being a little top dressing of artificial manure, once in four or five years.

By Mr. Pridham :

Q. I have a farm seeded down with June grass for the last twenty years, and it is better to-day than it was twenty years ago?—A. I am sure of it. And yet there are good farmers who do not appreciate the value of June grass, and will talk about it as of no value.

By Mr. Featherston :

Q. It is highly appreciated in western Ontario?—A. I am glad it is so.

By Mr. Hughes :

Q. Does it not dry out?—A. Not if most of the varieties are fed reasonably. I met a man, some three or four years ago, who told me that he had a piece of land in June grass that was no use at all, as it was always dried out all the summer. I found, on inquiry, that his custom was to take his cattle off in June, to what he thought, were better pastures which were low and produced a rank growth of grass, the result was the June grass did flower and dry out. He should have kept a few head of cattle there all the time, which would have prevented the stems from flowering, and the roots would have thrown all their energy into making leaves.

By Mr. McMillan :

Q. The common experience with us is that it is the proper thing to drive the cattle off?—A. Of course, in very dry lands it does not do as well as some of the other grasses which I have mentioned—the Sheep and Hard Fescues, for instance. Taken on the whole, however, I think there is no grass equal to it in value for pastures.

By Mr. Cochrane :

Q. You recommend it for permanent pasture?—A. It should be in every permanent pasture mixture.

By Mr. Cleveland :

Q. There is no necessity for sowing it; it will come in of itself?—A. It will. But there can be no harm in helping it along. Here is a later variety which is just appearing. Where you have an early flowering plant, some of the nourishment is taken out of it. This grass must have a rest after the stem is grown. The variety which I have here is from Glacier, in the Rocky Mountains. I have brought you these specimens to show how grasses of actually the same botanical species may differ.

By Mr. Roome :

Q. How does it differ from the Kentucky Blue grass?—A. It is identically the same. Kentucky Blue grass is the name put upon it when the seedsmen want it to fetch a high price. As Canadian June grass, I can get it for \$1 a bushel. There is no difficulty in getting a plentiful supply of the seed, if the farmers only set about it. Children can easily collect it along the roadsides everywhere. They cannot make any mistake as to the kind, because it is almost the only grass of which the seed is ripe by 1st July. This is the grass which every one who wants a good lawn should always sow. It should be sown very thickly, at the rate of about four bushels to the acre, and to this may be added about one and a half to two pounds of white clover. The lawn will then be fine; even in texture and uniform in colour.

Festuca elatior.—This grass is the tall Fescue; it is a coarse growing grass, but very valuable for its heavy crop of succulent hay that can be cut at this time or a little later. It flowers about the third week of June and does well to grow with clover. It has the quality of being extremely hardy and has succeeded perfectly well in Manitoba.

Phalaris arundinacea.—This is a grass for low meadow, that can be grown in wet land. It is called Canary Reed grass. When the seeds are ripe, the stems are 6 or 8 feet high. I recommend it for cutting at this time as a soiling crop. This is out from a bed very much exhausted; it has been cut now seven years. After three years it should be top-dressed to give a very good crop; it is really the wild form of the old fashioned Ribbon grass of the garden, and I have found by cultivating a bed of Ribbon grass, that that variety gives a larger and heavier crop of leaves. It seemed too æsthetic to grow as a crop, but I think it might be done successfully.

By Mr. McGregor :

Q. The cattle won't eat it if they can get anything else?—A. Our cattle will. See how soft and succulent it is.

By Mr. Ferguson :

Q. For soiling, how does this compare with fall rye?—A. It gives a heavier crop.

Q. I mean for nutritive value and weight compared?—A. I don't know.

By Mr. McGregor :

Q. Our cattle won't touch it all?—A. Ours was cut on the 4th of June when I made the test four years ago, and the cattle ate it with great avidity. It was then over 3 feet high.

By Mr. Wilson :

Q. You don't know how they would compare?—A. I don't know the comparative value.

Q. Would cattle eat it on pasture?—A. I am sure they would eat it. I don't recommend it for pasture, but as a green soiling plant.

By Mr. Hughes :

Q. How would that Wood Pea of yours do? Would it do well in a dry season?—A. Very well.

—A. It will, which is just punishment is. The variety brought you species may

identically the men want it to bel. There is y set about it. cannot make ich the seed is d lawn should our bushels to f white clover.

rowing grass, t at this time well to grow succeeded per-

n be grown in the stems are crop. This is . After three e wild form of tivating a bed of leaves. It successfully.

Our cattle will.

gives a heavier

t know.

f June when I . It was then

he comparative

eat it. I don't

a dry season?

Anthoxanthum odoratum.—Here is a grass of which I have brought a small bundle, to show you that a grass that is thought very well of in Europe does not do very well here, it is the Sweet Vernal grass. In Europe it is very early and gives a sweet flavour to butter and milk. Here, it is not early, and it loses that value. In our own wild Indian hay, too, we have a much sweeter grass, though one much more difficult to get rid of.

Agropyrum tenerum.—In Manitoba and the North-west a very great desideratum has been a grass of the same nature as Timothy, with straight clean and easily handled hay. We had great difficulty in getting one. I think this grass (Western Rye grass) the agricultural value of which was discovered in Manitoba by Mr. McIver, of Virden, is a grass which belongs to the same family as Quack grass, but has the great advantage of not forming running root stocks like that grass.

By Mr. McGregor:

Q. By Quack grass do you mean Twitch?—A. Yes, it is known as Twitch, Couch, Scotch and many other names. This forms a clean, heavy hay, very like Timothy in many respects, but which, although of the same family, never forms roots like Quack grass, and I think it will be a great acquisition on account of the cleanness of the hay and seed, which can be easily handled in commerce.

By Mr. McGregor:

Q. It does not grow so high?—A. It is pretty high. It will grow to four feet, about the same as Timothy.

By Mr. Cochrane:

Q. Can that be sown with wheat?—A. It can be done. I have tried some experiments sowing with grain and without, and though there is a slight advantage to the grass in having all the land to itself, the difference is so small that practically you lose a crop. Apparently it would be better to sow grass with a thin grain crop.

By Mr. McGregor:

Q. Supposing you had a bush pasture, you would sow just the grass?—A. Yes.

Q. And harrow it over as soon as possible?—A. Yes.
Deyeuxia Langsdorffii.—This is one of the blue joint grasses, and a grass not yet in the market, but I hope it soon will be, because it gives an excellent crop of hay and also green feed. I got the seed of this, north of Lake Superior. It is a northern variety of our own blue joint, which grows in all the swamps and streams in the country. They grow well, however, in dry land and this is earlier than the ordinary form. The hay is of excellent quality, and it is one of the grasses which first attracts the attention of the farmers who visit the experimental farm.

By Mr. Featherston:

Q. Have you no white clover?—A. I did not bring any with me to-day.

That is all I have to say, Mr. Chairman, about grasses to-day. I took this opportunity of speaking about them because they have proved of great interest to the numerous visitors to the Central farm. Last year a large number of farmers came on excursions to the farm, and they showed very great interest in this matter of pasture and hay grasses. The results of our investigation have now shown the use of the experiment which has been carried on sufficiently long to give us valuable data, of use to the country, and I am very glad to have this opportunity to meet the members of this committee, so that they may know, in the event of any of their friends wanting information about pasture and hay grasses, that these experiments are being carried on at the experimental farm, and we shall be glad to give any information in our power.

By Mr. Hughes:

Q. What was the cause of our Alsike clover failing last year?—A. I think it may possibly have been the clover weevil which I will speak of a little later. It is

a brown beetle, of which the grub feeds on the leaves and eats the plant. It is just the same colour as the plant and is easily overlooked. You mean a failure in the crop, do you not; or was it a failure in the seed crop?

Q. The crop was all right, but the seed was all wrong.—A. I had not heard of it

By Mr. Featherston :

Q. Was it not the midge?—A. I don't think so. I don't think the midge attacks the Alsike clover.

By the Chairman :

Q. This Wood Pea, is it grown with other grain?—A. No. It is better sown alone.

Q. And at what time?—A. In the spring.

By Mr. McMillan :

Q. I think, to experiment thoroughly with these grasses, they should be taken out from the beds, and put out into fields, because in beds they are cultivated under exceptional circumstances. It is really no guide to the farmer until they are tested in the field?—A. That is very true, and in calculating the results we always eliminate the outside strip, which gets special cultivation. With regard to the pasture mixtures, we have one-twentieth acre plots, and I think these will give us the results we want. The best mixtures will also be sown in larger areas. There is a mixture consisting of Timothy, Meadow Fescue, Orchard grass, June grass and four clovers. This, we find, gives a very satisfactory crop. It will be put in a much larger area this year. Three one-twentieth acre plots were put under it this year, and next year we shall put a much larger plot under the mixture. At the edge of a plot, even the fact of keeping the weeds out of the paths gives the advantages of cultivation itself, as is shown by the grass being much higher round the edge.

By Mr. Cochrane :

Q. But you get sufficient results to arrive at comparative calculations?—A. Oh, yes. We calculate that there is one-half more advantage to the plants that are round the outside than to those that are on the inside.

By Mr. Hughes :

Q. Is the path higher than the bed?—A. It is just about the same height.

By Mr. McNeill :

Q. Have you tried Orchard grass and clover together?—A. We have tried Red June clover and Orchard grass together. They are much better than the ordinary mixture of Red clover with Timothy. Mammoth clover makes a good mixture with Timothy.

By Mr. McMillan :

Q. How many varieties of grass have you got at the farm?—A. We have about 150 just now under trial.

Q. Would it not be better for you to decide which are best? It is rather confusing for the farmer to choose among so many varieties?—A. Well, yes, but we must try them, to find out which are the best. If a farmer comes he will see many things that he need not follow. But we must try them to see which is the best. But we do not recommend the 150 varieties, because many of them have no agricultural use at all. We find that many have to be discarded as agricultural grasses. I think our experiments have shown that there are about half a dozen or a dozen of the thoroughly high class grasses which can be grown in many parts of Canada. Certainly there is far too much of the ordinary mixture of Timothy and Red clover grown all over the country, whether that mixture is suitable or not for the locality. There are some grasses much more suitable than Timothy for some districts.

By Mr. McNeill:

Q. How does Orchard hay compare with Timothy in nutriment?—A. It is lighter and not so rich.

By Mr. Carpenter:

Q. Will you tell us what makes the best mixture for permanent pastures?—A. For this section?

Q. For every section?—A. The mixture I have spoken of is probably the best for a large part of Ontario and many parts of Quebec; in fact for the greater part of old Canada. It is composed as follows:—Timothy, six pounds; Meadow Fescue, four pounds; Orchard grass, two pounds; June grass, one pound, and where the land is wet there should be added one pound of Red Top. To this mixture you require to add, per acre, two pounds each of the four clovers, Red, White, Alfalfa and Alsike. That gives a crop of very excellent hay for two or three years, and then the meadows can be used for pasture for two or three years more.

By Mr. Pridham:

Q. That is about twenty pounds to the acre?—A. Yes. One of the great troubles in Canada is that the farmers do not put in enough seed. The fallacy of this is evident when you consider the price of the seed is so small compared with the results of rather heavier seeding.

By Mr. Cochrane:

Q. I myself have sown a bushel of clover and one of Timothy. The clover grew so heavy that we never had a spear of Timothy at all. Would you call that seeding enough?—A. I am afraid that is an exceptional case. It was probably a little too heavy. How many acres was that on?

Q. On ten acres?—A. The usual mixtures in Canada are too light. I think, as a rule, our farmers do not sow enough seed to the acre, twelve to fourteen pounds, altogether, is frequently all that is sown.

By Mr. Cargill:

Q. You are speaking of pastures, not for seeding down for hay?—A. Every pasture can be cut for hay and make an excellent pasture afterwards.

Q. About twenty pounds of seed per acre for hay?—A. Yes. About twenty-one pounds is what I recommended.

By Mr. McNeill:

Q. Your mixture is not for hay?—A. You can cut it for hay, and it makes a good permanent pasture afterwards.

By Mr. McMillan:

Q. How long will the clovers stand in the permanent pasture?—A. The greater part of the Red will die out at the end of the second year. The Lucerne or Alfalfa will last as long as you keep the land in hay.

By Mr. Semple:

Q. How long does the Alsike clover last?—A. About two or three years—about the same or a little longer than the Red. If they are sown together the Alsike will generally last longer. Alsike is normally a perennial, but it seldom lasts many years as a paying crop. Red clover is normally a biennial, but it varies so much that some plants live on for three or perhaps four years, some even become exhausted in one year.

ORNAMENTAL SHRUBS AND TREES.

There is another subject which I would like to speak about for a few minutes, that is ornamental shrubs. The question is one of practical value in this way: A large amount of money is spent every year by farmers, all through the country, in buying a few ornamental shrubs. You know how they like to have their gardens look pretty and desire to have a few ornamental shrubs about the house. The traveling agents go round with their pretty books and show the farmers the pictures, and you find that farmers generally buy the prettiest things in the book, perhaps never considering their suitability to the land or the locality where they live.

At the experimental farm, during the past three or four years, we have tested over 200 different kinds of shrubs and trees suitable for lawns. If you take the trouble to look at the seedsmen's catalogues, you will only find there about a dozen or two good ornamental shrubs suitable for growing in Canada. As I have just remarked, we have over 200. That number, I believe, can be more than doubled when we have time to look them up. I believe by drawing attention to these shrubs, we shall be able to prevent money being wasted, and induce our farmers who wish for shrubs, to buy something which is suitable. In the director's report, just issued, you will find a list of those shrubs and trees on the farm, which have been grown there within the last three or four years and found to be perfectly hardy. I have brought some specimens with me, which I thought the committee would like to examine. This is a specimen of one of the Japanese Honeysuckles, the botanic name of which is *Weigelia*. They are not perfectly hardy. There is this peculiar thing about some shrubs, that while they are hardy here, at Niagara and in the west they are tender. This is due to the fact that we get a heavier snow fall here, and the snow covering protects the delicate shrubs. In the west, however, where they have not so much snow, many are not sufficiently hardy to stand the winter. When the temperature reaches a certain point, we find that some of our plants and shrubs are killed. The *Weigelias*, however, are sufficiently hardy to make them desirable plants to grow in the colder sections, and they give us beautiful flowers on the wood, which is left after the killed-back tips are cut off.

By Mr. Roome:

Q. How high do they grow?—A. From 4 to 6 feet high. We have a great variety of them. This next is a specimen of the Bush Peony or Moutan. It is perfectly hardy here, flowering every year, but Mr. Saunders tells me that at Niagara it kills back badly.

By Mr. Rowand:

Q. To what height does it grow?—A. About 4 feet. If it would stand the climate in western Ontario, it would grow much higher.

By Mr. Carpenter:

Q. How long does the Japanese Honeysuckle continue in flower?—A. About a month.

By Mr. McNeill:

Q. Is it fragrant?—A. No. I have only one or two varieties here this morning of those which we have tried in the arboretum or botanic garden at the farm. We have about thirty varieties of the Japanese Honeysuckle or *Weigelia*, altogether.

By Mr. Pope:

Q. What is the best time to put them in?—A. I think in the spring. All the varieties which we have at the farm are named. If I remember correctly the collection came mostly from France. The production of these ornamental shrubs, over there, is a special business. They are sold in France for a few cents, while they would cost us considerably more here.

By Mr. Featherston :

Q. Is there any stock in this country?—A. No. That is the reason why I bring them before the committee to-day. The nurserymen should certainly see to it that they get more of them. This is the *Weigelia rosea*. It is a variegated form, but has not nearly such beautiful flowers as some of the forms I have shown you. They can all be grown from cuttings, either cut in the fall and kept cool during the winter, or from green summer wood. The Tartarian Honeysuckle, of which I have a specimen here, is perfectly hardy, and can be obtained from all seedsmen. I would like to refer for a moment to the subject of growing from the seed. Our shrubs are either grown from cuttings or seed, and the rapidity of growth is very remarkable. It is just three years since the seeds of this Tartarian Honeysuckle were sown. Here is a beautiful shrub belonging to the Rose family, originally from China. It is called *Exochorda grandiflora*, or Pearl Bush.

By Mr. Pope :

Q. That is not so hardy?—A. It is not perfectly hardy, but it is a beautiful plant and flowers for about three weeks, and has stood our winters in a shrubbery for three years. It is grown from seed or cuttings, but is rather hard to propagate. This, the *Spiraea Van Houtte*, is a bush which grows about four feet in height, and at this season of the year it is a perfect mass of beautiful white flowers. This, I consider one of the very best of ornamental flowering shrubs.

By Mr. Semple :

Q. Does it grow from cuttings?—A. It is very easily grown from cuttings obtained in the autumn. Among the roses there are some beautiful forms. This is the little Irish rose (*Rosa spinosissima*). There is one satisfactory thing about this, respecting which people can take their choice. It is called both the Irish and the Scotch rose. There are many beautiful single white roses, some of which grow in this country, as *Rosa lucida*, *R. Arkansana*, the Prairie Rose, and *R. cinnamomea*. This is the purple-leaved rose from the south of Europe. It is a very pretty thing for ornamental planting. It is perfectly hardy and grows freely from seed. Here is a specimen of the white variety of the Japanese rose (*Rosa rugosa*).

By Mr. Cochrane :

Q. Is it hardy?—A. It is perfectly hardy, both here and in the North-west. Among the *Spiræas*, this Golden *Spiraea* is a valuable plant for hedges. It is perfectly hardy and makes quick growth.

Q. Did you ever try honeysuckle as a hedge?—A. The Tartarian Honeysuckle will make a hedge, but it is too light in its growth. This is the British Columbia Barberry or native Holly (*Mahonia Aquifolia*). Among valuable plants are the cultivated forms of our native White Cedar. This is one of the variegated forms. These cedars may be grown from cuttings very easily. We have grown large quantities of them every year at the experimental farm. It is the simplest thing in the world to grow them. You take a little twig, trim it down, take off the side shoots, and then put it in sand and keep it through the winter in a cold house. In the spring, the young cuttings will be found to have calloused over, when roots are formed they are planted out in rows. They make about four inches of growth during the first year. This rule will apply to all the Arbor Vitæ. One of the most beautiful varieties of our native cedar is the Douglas Cedar, or Golden Cedar. It can be grown in the same way from cuttings. So also can this graceful Japanese Cypress (*Retinospora plumosa*).

By Mr. Featherston :

Q. How high does the Japanese Cypress grow?—A. About four or five feet, with us. Then we have the *Thuja Hovei*, which is shaped like an egg. It keeps that shape naturally, and does not require to be trimmed. I would like also to draw the attention of the committee to the so-called Russian Olive. It is not, however,

an olive at all, although it looks like it. It is of great value on account of its intense hardiness. It can be grown anywhere, and is, consequently, of the utmost value in the North-west. Then we have its relative, our native Wolf Willow, or Silver Bush (*Elaeagnus argentea*). It is well known in the North-west. It is a very acceptable shrub here, because in this part of the country it is unusual to find silver trees. Among the leguminous plants—the pea family—there are several which are valuable. This is a specimen of the *Caragana arborescens*, or Siberian Pea tree. Its chief characteristic is its hardiness. It is also of great beauty, whether in flower or not. It can be grown easily from seed, and is calculated to be of the greatest value in the North-west. Here is another of the same class known as the *Cytisus Ratisbonensis*, of less beauty, but with more conspicuous flowers.

By Mr. Cochrane :

Q. What is its English name?—A. I regret to say that it has as yet no English name. Among the maples, we have several valuable forms. This is a specimen of Schwerdler's Maple. It is a beautiful object in early spring. The leaves are blood red, and it bears at the tip of each branchlet a cluster of golden yellow flowers. It is a variety of the Norway Maple and is quite hardy. This is a twig of Wier's Cutleaved Maple. It is very curious and pretty when you examine a twig of this size, but as a tree it is too ragged to be recommended, except as a curiosity. It belongs to the Silver Maple family and has the same bad habit of growth and brittleness, large limbs often breaking off. This is a specimen of the *Acer Ginnala* a variety of the Tartarian maple. I am sorry to say some of these shrubs have not English names. In the spring this is all covered with whitish flowers. Among the purple leaved plants, there is the purple plum (*Prunus pissardi*) which is rather desirable, but it is not hardy enough for this district. The *Acer ginnala* comes from Tartary. It is found in the Amoor district and in the northern parts of China and Japan. In the autumn it is covered with intensely crimson leaves and is very beautiful. Its habit of growth too is very elegant. It has the shape of a tree with a trunk, but is small in size like a shrub. It seeds freely here and is easily propagated from seed. There are many more beautiful shrubs I might mention; but the few I have shown will indicate what we are doing in this line, and I shall be glad to give any information in my power, to those desiring it, or to show any one the collection in the botanic garden at the experimental farm where I now have a collection of about 700 different kinds of trees and shrubs. In most cases, I have two living specimens of each variety or species.

Mr. Fletcher was requested to address the committee at a future meeting in relation to injurious insects.

COMMITTEE ROOM 46, HOUSE OF COMMONS,
TUESDAY, 12th June, 1894.

The Select Standing Committee on Agriculture and Colonization met at 10.30 a.m. to-day, Dr. Sproule, chairman, presiding.

MR. JAMES FLETCHER, entomologist and botanist at the Central experimental farm, was again in attendance at the request of the committee. He said:—I am very much obliged to you, Mr. Chairman and gentlemen, for an opportunity of speaking a few minutes, again, on the work I am doing. I consider it a very great advantage to all of us at the experimental farm to be called before this committee, because your report is printed long before our annual report can be issued. The excellent way in which your agricultural committee report is got out, and edited, the concise way in which it is indexed and prepared makes it of extreme value to us in carrying on our work. The edition of separate copies of my evidence

t of its intense
most value in
or Silver Bush
ery acceptable
and silver trees,
which are valu-
Pea tree. Its
ther in flower
f the greatest
as the *Cytisus*

which you gave me last year I found of great value, and I was able to send it to my correspondents in very many places, before our own annual report; and it is of very great advantage to us to have this concise and well arranged report or resumé of our work of the year to send to our correspondents. Our annual report, necessarily, on account of its size being very bulky, is difficult to get out in time, and therefore, a short resumé of the work, giving the latest discoveries and remedies is of great use to us. I am thus very glad to appear before you to-day to mention some items which I believe it will be of no small value to the farmers of Canada to get out through the country before the next experimental farm report could be distributed.

POTATO ROT AND REMEDY FOR.

One particular subject of great interest is potato rot, which has been pretty thoroughly treated before by myself and lately by Mr. Saunders before this committee, and in my annual report for 1892. I shall refer to it briefly as it has been referred to by Prof. Saunders who gave its history and the best remedy. I do so now, merely on account of having received a request from the committee, through Mr. Craig, to speak of it. I have brought with me two photographs illustrating the benefit from spraying plots of potatoes attacked with potato rot disease, and the advantage is seen plainly by these two photographs. Those unsprayed, it will be seen, lost every leaf. Those sprayed have their foliage very fully developed and retained, and as a consequence, the crop was very much heavier. The remedy is very simple indeed. It is known as the Bordeaux mixture, a mixture of lime (4 lbs.) and sulphate of copper (6 lbs.) in 45 gallons of water, applied by means of a spraying pump to the foliage, and in that way the fungus is checked at a critical time when it is being propagated from the spores. The importance of this subject is shown, when what is well known is drawn attention to, viz., that at least one half of all the potatoes grown in the world is destroyed every year by this disease; and further, that this simple remedy to check it has been discovered and when used it protects the crops very largely.

By Mr. Carpenter :

Q. You add Paris green to that as well, don't you, for the purpose of killing potato bugs?—A. Yes. The advantage of mixing anything which contains lime with Paris green is now a well acknowledged one; the great difficulty in using arsenites was their causticity and the consequent burning of the foliage. The result of mixing lime with Paris green in equal quantities, one pound of Paris green and one of lime to 200 gallons of water, for the codling moth or the plum curculio; or one pound to 100 gallons of water for potato insects, is that the causticity is neutralized and the double effect is procured of destroying the insects and at the same time preventing any harmful effects on the foliage, and I may add that, in the Bordeaux mixture with Paris green, at the same time you can treat the fungus disease and the insect enemies. The black spot of the apple has been successfully treated by Mr. Craig and others with the same mixtures. There are two other fungi I wish to speak of, these are parasites of injurious insects.

By Mr. Girouard (Two Mountains) :

Q. Allow me to ask, professor, whether you haven't the intention of having all these receipts printed and distributed among the farmers. You give us the receipts here. It is all right to have them in your report, but your report is printed too late?—A. We get it to farmers and others much sooner by having it in the report of the committee. That is the reason I mention it here. I can thus get it printed earlier and I can then distribute it where it will be useful sooner.

By Mr. Dupont :

Q. You have it published in the *Agricultural Journal* in Quebec?—A. Yes, my reason for mentioning this particular matter this morning is to get it into your report.

By Mr. Girouard (Two Mountains) :

Q. When will this report be printed and distributed?—A. Six months before ours.

Q. The potatoes are growing then and it is too late?—A. I have a letter now written ready for the newspapers, which I published last year, and I intend to publish it again in a fortnight or so, giving very shortly the life history of this disease and the remedy. This is sent to all the French and English papers throughout the country, who have always been kind enough to publish promptly such matters.

By Mr Featherston :

Q. You send it to the stock papers too?—A. Yes, to all papers circulated to those to whom I think the information will be useful.

By Mr. Dupont :

Q. Will plaster do the same as lime for mixing the Bordeaux mixture?—A. No, it is not the same at all. You must use fresh lime.

FUNGOUS PARASITES.

There is another fungus I would like to draw attention to, a parasitic fungus. This is a parasite of the white grub (*Lachnosterna*), one of the very worst enemies we have to strawberries and also to pastures. It is a very difficult insect to fight against, because the grub lives for two years under ground out of sight, the caterpillar or grub of the June bug, a large black beetle, which at night frequently flies into windows at this time of the year. The grub is a large white grub which destroys strawberry roots and lives in the ground. This specimen which I now show you is a parasitised grub destroyed by a fungus called *Cordyceps melolonthæ*, it was sent to me by Mr. Sidney Fisher, of Brome, Que., and I have no doubt that if this parasite can be propagated and distributed, which I am trying to do at present, the attacks of this insect will be largely controlled. It is a very infectious disease, and the spores are given off by the fungus, and any insect that comes in contact with them, is destroyed by it, the same as by any other infectious disease.

Another parasite is that of the Clover Leaf Weevil (*Phytonomus punctatus*), and this has the same effect on the caterpillars by destroying them in large numbers. When attacked, the caterpillar crawls up to the top of a stem of grass or any other plant, and dies. The spores break through the skin, and are blown by the wind and come in contact with any other insect or the food which they eat, and the insects of the same species are destroyed in large numbers. We find nearly all these parasitic fungi are of the same nature in their effect upon their victims.

By Mr. Carpenter :

Q. Do you suggest a remedy for the clover weevil?—A. The insect feeds on leaves of clover. It is difficult to spray anything on a fodder plant, so the discovery of this disease in Canada is a matter of some importance. The weevil is not a common pest and is kept largely in check by this fungus which is called *Entomophthora sphaerosperma*.

By Mr. McDonald (Assiniboia) :

Q. Are the June bugs the same as the caterpillars that feed on cabbage?—A. No. The caterpillars on the cabbage are the caterpillars of the white butterfly. The best remedy is Pyrethrum powder and flour, one of the former to four parts, by weight, of the latter.

Q. Many are of that opinion?—A. The grubs of June bugs feed on the roots of plants entirely.

PEACH BARK BORER (*Phlebotribus liminaris*), ETC.

Another insect I wish to speak of is the peach bark borer. It is an extremely minute insect. I have brought some to show how a very small insect may do a great injury. It is exceedingly small, about the size of the head of a medium sized pin. An important discovery has been made with respect to it;—it was always supposed, like other bark boring beetles, that it copulated and laid eggs in May and June, but we find they are active very much earlier in the year, and that they move about and

e a letter now
intend to pub-
of this disease
throughout the
h matters.

circulated to

ture?—A. No,

parasitic fungus.
worst enemies
insect to fight
light, the cater-
re frequently flies
which destroys
show you is a
it was sent to
if this parasite
ent, the attacks
and the spores
th them, is des-

punctatus), and
large numbers.
ss or any other
y the wind and
d the insects of
these parasitic

insect feeds on
so the discovery
vil is not a com-
Entomophthora

obage?—A. No.
terfly. The best
arts, by weight,
d on the roots of

is an extremely
ot may do a great
edium sized pin.
always supposed,
y and June, but
y move about and

may be found on the bark in March. Having discovered that, we are now able to treat them for a very much longer time than before, by the application to the bark, much earlier, of mixtures which will not injure the tree, but will penetrate the burrows of the beetle and destroy them, whereas in the months of active growth, it is almost impossible to apply anything to the bark of the young tree without injuring it, but by beginning earlier, I think we shall be able to deal with this insect successfully.

Belonging to the same family is another insect known in Nova Scotia as the Pin Borer or Shot Borer (*Xyleborus dispar*), on account of the small hole it makes. One of these little beetles will eat its way into a tree and destroy it. Its work seems to have a poisonous effect on the wood for some distance beyond the actual injury, and though I have not yet found a satisfactory remedy, I have had considerable success in washing the trees with alkaline washes, such as soft soap, or a mixture of soft soap and carbolic acid. The desideratum is to know the exact time when the insect is passing through its various stages. I have several careful observers at work helping me, by watching it in their orchards, and I have no doubt that in course of time we shall secure a satisfactory remedy.

A new insect in the St. Catherines district is the Grey Peach Weevil (*Anametis grisea*), which crawls up the stem in spring and eats the flower buds. We find by studying the structure of the beetle, a means to fight against it is indicated, because unlike most beetles, it has wing cases but no wings with which it can fly. Therefore the application of anything round the stem, or even the tying of a piece of wadding round the trunk has the effect of preventing these insects from crawling up the stem and attacking the buds.

I will refer to one more small but very injurious insect, the caterpillar of a very small moth, *Coleophora Fletcherella*, which attacks chiefly apples, but also pears and plums. It passes the winter in the caterpillar stage, closely sealed up in a small curved case; it is at this time not half grown. The caterpillars collect together in clusters in the forks and c. the twigs of the tree. They leave their attachment in the spring and crawling up the boughs attack the young leaves. It is a small insect, but occurs in enormous numbers, and has done considerable injury. It has been treated successfully by Dr. D. Young, of Adolphustown, with kerosene emulsion, early in spring, and also by spraying with Paris green.

There are two other injurious insects of special note which have appeared in Canada since I last had the honour of addressing you. One of these is known as the San José Scale, and is well known on the Pacific coast on account of the enormous injuries it has done in California in the orange plantations there. It has been lately sent to me from British Columbia, and I am taking measures to have it stamped out as soon as possible. It is a scale insect, of the same nature as the Scurfy Bark-louse and the Oyster Shell Bark-louse of the apple; its latin name, *Aspidiotis perniciosus*, is significant of the great amount of injury it may be the cause of. It can be treated successfully with kerosene emulsion.

The other new pest which has invaded Canada is the Pear-tree Psylla (*Psylla pyricola*). Specimens have been sent to me by Mr. Freeman, of Freeman, Ont., whence it was brought from the state of New York, where it is abundant and injurious. Its life history has been worked out in the United States, and I do not doubt that with care we can stamp it out. On this first occurrence in Canada, it is reported as having attacked an orchard of three hundred Bartlett pear trees. Mr. Freeman is trying remedies persistently and before very long I hope he will have eradicated it from his orchard.

A NEW INSECTICIDE.

A new poison we are trying may be mentioned; this is called arseniate of lead. It is claimed to be better than many of the arsenical poisons we now use, in that it is not caustic and does not injure the foliage. It was first introduced by Prof. Fernald, of the Gypsy Moth Commission. An insect was introduced in this country by a student of silks, in New England, who thought by procuring insects from many parts of the world, he might be able to get new silk insects. Among these, he introduced one of the worst pests of all deciduous trees, from the north of Germany. It has spread

now over the New England States, and in the United States about two and a half million dollars have been spent in trying to eradicate it. They are now, by active measures, holding it in check. We do not want anything of the kind introduced into this country, but this is one of the good results of trying to find new remedies. This new arseniate is used like Paris green and it has, moreover, no injurious effects on the foliage. I am trying experiments with it this year and possibly we may find that it is even of more value than Paris green, although we cannot over-estimate the value of that article, which has many features which make it valuable as a poison, the best being its bright colour. There is a general opinion that anything green is poisonous and the intensity of its greenness makes it so easily visible that it reduces the danger of carelessness to a minimum. By properly mixing it with lime the caustic properties are neutralized. There should be no danger in using it, with the exercise of ordinary precaution. No remedy can compare with Paris green for applying to potatoes for the Colorado potato beetle. It should be applied generally throughout the country by all who wish to cultivate the potato. It is cheap and readily applied.

By Mr. Carpenter :

Q. I am sure the committee will be glad if Mr. Fletcher will tell us something respecting the horn fly and its treatment?—A. As I informed the committee last year, the most satisfactory treatment was either by spraying the cattle with a mixture of coal oil and soap suds, made into an emulsion, or a mixture of tanner's oil or any cheap animal or fish oil mixed with a little carbolic acid. It can either be put on the animals with a cloth or sponge, or sprayed on them. Any of these emulsions will prove satisfactory, but they must be applied systematically. Where they have been tried systematically they have been very successful. I will repeat again what I said on previous occasions, that the probabilities are we have seen the worst of this pest, and that it may not be very long before we get rid of it altogether. The experience in those sections of the United States where two or three years ago it was very bad, is that it is disappearing.

By Mr. Featherston :

Q. Is there any danger of the carbolic acid getting into the eyes of the animal?—A. The effect of carbolic acid, greatly diluted, on even an open wound, is antiseptic and healing.

Q. Would it not likely injure the eyes?—A. Not when diluted to the necessary weakness.

By Mr. Dyer :

Q. What amount of carbolic acid do you use?—A. Two ounces in a gallon of oil. Mr. Carpenter tells me he puts on four times that amount without evil effects.

By Mr. Carpenter :

Q. I had to apply the mixture with a sponge as I found it would not spray. As Mr. Fletcher says, I used four times the quantity of carbolic acid which he recommended, and it did not injure the animals, except that perhaps some of them lost a little hair. Where care is used there should be no danger?—A. I do not understand how it is Mr. Carpenter's solution did not spray, because the kerosene emulsion is as thin as milk when properly diluted.

Before sitting down, I desire to express my thanks to the committee for the kind and patient hearing which they have given me.

Having examined the preceding transcript of my evidence of the 5th and 12th of June, I find it correct.

JAMES FLETCHER,

Entomologist and Botanist to the Dominion Experimental Farms.